UNITED STATES PATENT AND TRADEMARK OFFICE

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10/763,185	01/26/2004	Akiyoshi Tafuku	1083.1099	6510

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 April 2008*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-16,18,19 and 21* is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3-5,7-14,16 and 19* is/are allowed.

6)☒ Claim(s) *1,2,15,18 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☒ All   b)☐ Some * c)☐ None of:

       1.☒ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____.

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

1.   This action is responsive to communications of amendment received 4/03/2008.

2.   The disposition of the claims is as follows: claims 1-5, 7-16 and 18-19 are pending in the

application. Claims 1, 3-5, 7-9, 15-16 and 18-19 are independent claims. Claims 6, 17 and 20

were previously cancelled. Claim 21 is newly added.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
> sale in this country, more than one year prior to the date of application for patent in the United States.

4.   Claims 1, 2, 15, 18 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by

Xiao-guang Lv Jie Zhou Chang-shui Zhang, "A Novel Algorithm for Rotated Human Face

Detection", hereinafter Lv.

A.   Lv discloses claim 1, "An apparatus for detecting orientation of a face [see 'oriented'

and/or 'orientation' throughout document, along with Figs. 1a&b, 3 and 4] from image data

acquired by photographing the face [see p. 3 at 'We apply the above framework to the face

libraries of MIT and our lab, all of which are real-life face images captured by CCD camera.'],

the image data being composed of a plurality of pixel data aligned in horizontal direction and

vertical direction [see 'pixel (x, y)' on p. 2 and 'pixel(s)' throughout the rest of the document,

wherein 'x' corresponds to horizontal direction and 'y' corresponds to vertical direction],

respectively, comprising:

a vertical adding section derives a graph showing values of summation of the pixel data

[p. 1 – 2 at 'In the above equations, Ω is a small neighborhood of pixel (x, y) , whose size is

related with the size of the object we want to analyze.'; and p. 2 at 'where α is the angle of any

orientation between 0 and π, g(x, y) is the anisotropic strength of pixel (x, y) whose orientation is

α . In the histogram of one image, H(α) represents the anisotropic strength along the orientation

α.'; 'For each pixel in the input window, the orientation θ and anisotropic strength g are

calculated respectively. In order to remove the influence of orientation brought by small gray

scale difference between pixels (for example, in some smooth area, due to the quantisation of

gray scale, the pseudo orientation may occur.), we only consider the pixels whose gradient

magnitude exceeds a threshold.'; See Histogram graphs calculated using Eq. 5 wherein

summation sign $\sum$ corresponds to "vertical adding section" and Histogram graphs in Figs. 1(d)

and 2(e) correspond to "a graph showing values of summation of the pixel data"; and '(b)

Orientation map of (a) (on a gray scale from 180 degree, white to 0 degree, 128; the black means

the pixel is not under consideration).'; wherein all x, y correspond with horizontal and vertical

respectively.], which are calculated by adding the respective pixel data in the vertical direction of

the image data, along the horizontal direction [see histogram throughout document, for example,

but not limited to p. 2 at 'In order to analyze the distribution of orientations, we develop a

histogram, which is constructed by: {see equation (3)} where α is the angle of any orientation

between 0 and π, g(x, y) is the anisotropic strength of pixel (x, y) whose orientation is α. Wherein

'y' corresponds to "vertical direction" and summation sign $\sum$ corresponds to "values of

summation of the pixel data"]; and

an orientation detecting section for detecting a face orientation based on a plurality of

sum values calculated by said vertical adding section [see 'detection, detect, detectors, detecting,

and detected' throughout document, and on p. 2 at 'For a rotated face, the orientation of principal

axis represents the face rotation status with respect to upright situation. Suppose that the input

window contains one face, then we can take three steps as follows:

1. Obtain the statistical orientation feature. For each pixel in the input window, the

orientation θ and anisotropic strength g are calculated respectively. In order to remove the

influence of orientation brought by small gray scale difference between pixels (for example, in

some smooth area, due to the quantization of gray scale, the pseudo orientation may occur.), we

only consider the pixels whose gradient magnitude exceeds a threshold. In a circular window

mask the orientation histogram is generated. For real implementation, $\alpha = \{0, bin, bin \times 2, ..., \pi -$

$bin\}$ ...(5) where *bin* is the interval of two neighboring sampling orientation. The resolution of

orientation can be adjusted by *bin*. The reason we use the circular window mask is to satisfy the

isotropic computation.

2. Measure the symmetry of the histogram $H'(\alpha)$. We investigate the symmetry of $H'(\alpha)$

with respect to any α: $\alpha = \{0, bin, bin \times 2, ..., \pi - bin\}$. ...(6)

3. Determine the orientation of the principal axis. $H'(\alpha)$ is symmetric with respect to β,

the orientation of the principal axis. So the symmetry measurement on the orientation of the

principal axis results in a small value, may be the minimum one. Since orientations of the pixels

in the oriented organs such as eyebrows and mouth are close to the orientation orthogonal to the

principal axis, a local peak is generated at this orientation in the histogram $H^r(\alpha)$. So two

measurements can be used — symmetry (nature in face) and peak (distribution of oriented

pattern in face). Using both symmetry measure and local peak information, a criterion for

determining the orientation of the principal axis is created as follows: (7) where $h(\alpha)$ and $sm(\alpha)$

, which range from 0 to 1, denote the normalized $H^r(\alpha)$ and $SM(\alpha)$, respectively; w1 and w2

are weighting factors which control the relative importance of the $h(\alpha)$ and $sm(\alpha)$. Then the

orientation of the principal axis can be obtained, at which the maximum value of the $OA(\alpha)$ is

acquired. See Fig.2 for an illustration on finding the orientation of the principal axis.

3.3 Detecting with Upright Face Detector

With orientation of symmetry axis, We apply one classical upright-face detector proposed

in [3] to detect the "derotated" window where a face is supposed to be contained.

So far, the rotated face is extracted.'

Furthermore on p. 3 at 'We apply the above framework to the face libraries of MIT and

our lab, all of which are real-life face images captured by CCD camera. They include faces in

different situations, such as in different lighting conditions, with beard or even with the glasses.

In our experiment, the rotated faces, which can not be extracted by conventional upright

face detection systems, are tested. The results are rather satisfying and the exact orientation of

the principal axis can be detected for over 98% of the images. Some of results are illustrated in

Fig3. The *bin* of the histogram $H^r(\alpha)$ is set to 6 degree. The weighting factor w1 in Eq.(7) is set

to 0, and the w2 is set to 0.3.'']", supra [as detailed].

B.   Per independent claims 15 and 18, these are directed to a method and computer memory

product, respectively, for apparatus of independent claim 1, and therefore are rejected to

independent claim 1.

C.   Lv discloses claim 2, "The face orientation detection apparatus of claim 1, further

comprising:

        an extracting section for extracting characteristic data of a plurality of sum values

calculated by said vertical adding section [see extracted throughout document, for example

section 3.3 and Fig. 3]; and

        a characteristic table storing the characteristic data in association with a plurality of face

orientations [see 'bin', wherein corresponds with 'bin', for example p. 2 bottom of second column,

and top the p. 3 second column],

        wherein said orientation detecting section selects, from said characteristic table, a face

orientation corresponding to the characteristic data extracted by said extracting section

[corresponds with p. 2, at 'the resolution of orientation can be adjusted by bin', wherein 'bin'

corresponds to "table"]" supra for claim 1 and [as detailed].

D.   Lv discloses claim 21, "A method, comprising:

        adding pixel data aligned next to each other in a vertical direction of an image frame to

create a graph that shows values of the added pixel data along a horizontal direction [wherein x,

y correspond with horizontal and vertical directions, respectively. Fig. 2(a) corresponds to

original face image frame data]; and

determining an orientation of a face based on the created graph [Fig. 2(e) corresponds to

Histogram calculated by Eq.(5) and showing orientation at 160]" supra as in claims 1 and 15 and

furthermore [as detailed].

Allowable Subject Matter

5.   Claims 3-5, 7-14, 16 and 19 are allowed.

6.   The following is a statement of reasons for the indication of allowable subject matter:

The closest related art, Kaneshiro Naoto (JP 00137788), hereinafter Naoto, provides for

the face of the human is extracted from an image to be processed, the face candidate area is

divided into a specific number of blocks (division patterns are shown by broken lines in (A)),

and integral values of edge intensity in the top-bottom direction of the image are found, block by

block. The feature quantities found for each block are collated with patterns for matching (cf.

(B)) found by dividing the face area actually corresponding to the face of the human according to

the division patterns and calculating edge intensity integral values for each block to evaluate the

accuracy of the face candidate area as an area (face area) corresponding to the face of the human.

However, Naoto does not provide for "a horizontal adding section for adding the

respective pixel data in the horizontal direction of the image data; an eye detecting section for

detecting an eye position in the vertical direction based on a plurality of sum values calculated by

said horizontal adding section; an eye vicinity adding section for adding the respective pixel data

in the vertical direction in a vicinity region of the eye position detected by said eye detecting

section; an orientation detecting section for detecting a face orientation based on a plurality of

sum values calculated by said eye vicinity adding section" as claimed in independent claims 3-5,

16 and 19.

Nor does Naoto disclose in addition "a vertical adding section for adding the respective

pixel data in the vertical direction of the image data; a variation calculating section for

calculating a variation in the horizontal direction of the sum values calculated by said vertical

adding section; and a specifying section for specifying a face outline in the horizontal direction

based on the variation calculated by said variation calculating section, wherein said region

detecting section detecting the face region based on the face outline specified by said specifying

section" as claimed by independent claim 7. Nor disclose "pixel number storing section for

storing a predetermined number of pixels; a horizontal adding section for adding the respective

pixel data in the horizontal direction of the image data; an eye detecting section for detecting an

eye position in the vertical direction based on a plurality of sum values calculated by said

horizontal adding section; an under eye adding section for adding the pixel data in the vertical

direction in a region located lower than the eye position detected by said eye detecting section by

the number of pixels stored in said pixel number storing section; and a local minimum value

specifying section for specifying a local minimum value of the sum values calculated by said

under eye adding section, said nose detecting section detecting that a position in the horizontal

direction of the sum value specified as the local minimum value by said local minimum value

specifying section is the nose position" as claimed in independent claim 9.

Therefore as claimed by the combined elements of independent claims 3-5, 7-9, 16 and

19, the cited references and prior art of record lack separately and in combination the elements of

said independent claims. Claims 10-14 depend from allowable independent claims 7-9 and

therefore are also allowed.

Response to Arguments

7.   Applicant's arguments filed 4/3/2008 have been fully considered but they are not

persuasive.

Given the broad limitation of "pixel data" and "image data" with respect to summation,

vertical and horizontal, the Lv reference for graphing Histograms reads on the present claim

language for claims 1, 2, 15 and 18.

Conclusion

8.   Applicant's amendment necessitated the new ground(s) of rejection presented in this

Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

Responses

9.   Responses to this action should be mailed to: Commissioner of Patents and Trademarks,

Washington, D.C. 20231.

Inquiries

10.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Gregory F. Cunningham whose telephone number is (571) 272-

7784.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Matt Bella can be reached on (571) 272-7778. The Central FAX Number for the

organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Greg F Cunningham/

Examiner, Art Unit 2624

/Matthew C Bella/

Supervisory Patent Examiner, Art Unit 2624